What Is the Best Tape for Flat-Top Plates?

(Part One)

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Introduction

Most people in the Flexo Industry would agree that digital flat-top dot profiles offer advantages that have allowed Flexo printing to excel to new levels. The ability to hold extremely fine imaging details has opened the door to new screening solutions that benefit us in highlight and solid reproduction, overall opening our potential print tonal range. Couple this with improved impression latitude and we now have a powerful ink transfer substrate that offers press operators new advantages to optimize and expand their print capabilities.

Our team is often involved in optimizing new plate material or analyzing plate trials to compare plate performance. In many cases, we are asked, "What tape should I run with my plate?" This has specially been the case with flat-top dot plate introductions. We are also involved in many mounting tape trials as our customers look for ways to optimize and streamline their mounting process. In recent years, after numerous such evaluations of plate and tape trials, we started to notice that for digital flat-top plates tape durometer/compressibility may have less impact or at least a different impact on print quality then it has historically with analog or digital round-top plates. Digital flat-top plates seemed to challenge our traditional expectations for hard vs. soft mounting tapes. Our goal was to explore one of two possibilities. Can we zero in on a specific tape configuration that optimizes both screens and solids for flat-top plates? Or can we confirm that tape durometer is not as meaningful a factor for digital flat-top plate trails? Either way, this could play out to be an advantage to simplify the mounting process.

Setting the Stage

Based on this concept we outlined the parameters for a more controlled experiment to test our theory. We chose to focus on a plate that incorporated the in-the-plate flat top make-up and a range of tape durometers from different tape manufactures. We also wanted to compare how the plate/tape packages performed as impression was increased above kiss impression. We conducted the first trial at our APR Glendale Heights, IL Innovation Center on a narrow web press with UV inks on a film substrate. For the second trial we changed to a different narrow web press, with a different anilox engraving and water-based ink system.

Plate Trial #1 Parameters	
Press	Bobst M5
Speed	100 FPM
Ink	Flint UV
Anilox	Apex GTT XS
Substrate	White BOPP
Plate	0.045" ITP-M
Tape	0.015", 3M / Lohmann / Tessa
Impression	Kiss / Kiss +2 mil / Kiss +4mil / Kiss +6 mil
Device	Techkon SpectroDens IV and Troika Plate-II-Print

Plate Trial #2 Parameters	
Press	OMET
Speed	100 FPM
Ink	Environmental Water-Based
Anilox	Harper 1200/1.8, 60° hex
Substrate	White BOPP
Plate	0.045" ITP-M
Tape	0.020", 3M / Lohmann / Tessa
Impression	Kiss / Kiss +2 mil / Kiss +4mil / Kiss +6 mil
Device	Techkon SpectroDens III and Troika Plate-II-Print

Evaluation Parameters

Our test form incorporated several test elements for screens and solids. We optimized the press run by establishing good, even anilox impression, then optimized plate impression. We chose to run with a cyan ink and corresponding anilox designated for process color printing. Both solid ink density (SID) and a 50% tonal wedge were measured on both sides of the web to ensure even ink transfer and impression across the web.

Our initial analysis focused on 5 key evaluation points:

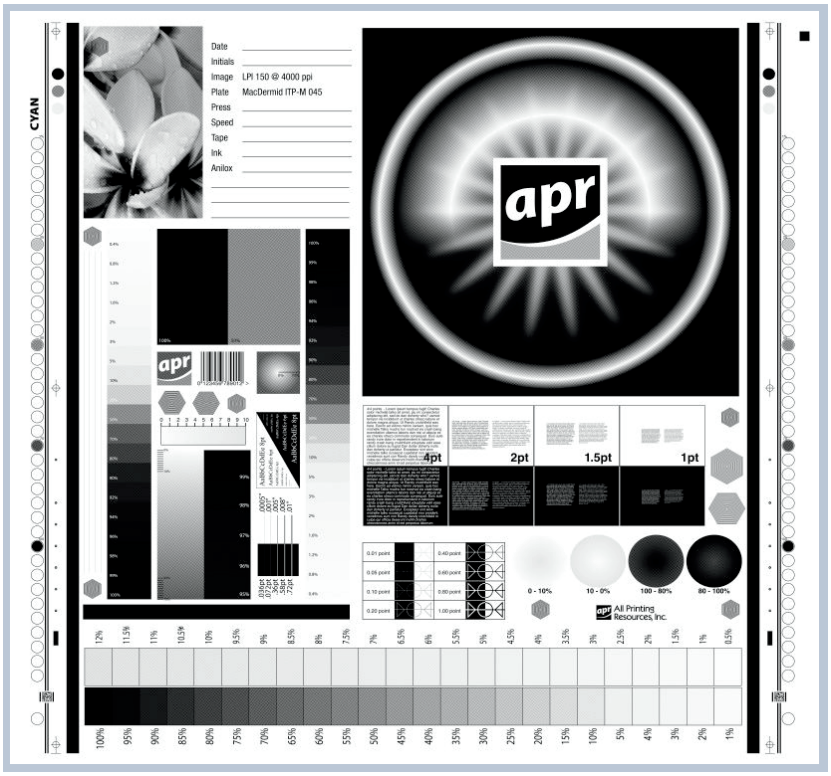
1. Measured Solid Ink Density
2. Measured Dot Gain
3. Measured Impression Latitude
4. Visual Quality of Solid
5. Visual Quality of Dots

Our objective was to look for samples that stood out via either subjective visual assessment and/or based on objective device measurements.

Question 1: Did any one tape or tape durometer outperform the others?

Question 2: Do we see a break from traditional print performance characteristics where solids perform better with firmer tapes and screens perform better with softer tapes?

Question 3: Does tape durometer impact or correlate to impression latitude?



Results Summary

Below are our Results Summary which we hope will offer some general guidance. In general, it was very challenging to officially declare any tape or tape durometer as standing out from the rest. Measurements and visual evaluation were focused on 1.2%, 25%, 50%, and SID targets. As expected, samples from the UV print trial were generally better then the water-based print trial. The UV trial offered more consistent densities and tighter overall impression latitudes even between the best and worst offenders as compared to the water-based trial. The primary issue with the water-based ink trial was keeping the plate clean.

One area that does appear to have promise is that with flat-top dot impression latitude, printer's may have the ability to get excellent results while not having to use as many types of compressible sticky-backs. Tape durometer does not play as important a role in print quality when combined with digital flat-top plates. This initial assessment focused on a printability analysis of the solid ink density and dot area; however, we understand to truly analyze print quality it is also important to analyze longevity as well. It would be beneficial to assess how long a plate/tape combination will print well and consistently. The value is understanding at what point the existing print results begin to fail and incur more press time to stop and clean the plate during long production runs. Thus, it is clear more work and testing needs to be done (see Next Steps).

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Results Summary

UV Inks

Softest	1.20%	25%	50%	SID
1915 KISS	15.0	51.3	79	1.53
1915 KISS+2	14.4	51.5	78.5	1.58
1915 KISS+4	13.9	52.0	79.7	1.55
1915 KISS+6	14.6	51.5	80	1.61
Range	1.10	0.70	1.50	0.08

Med Soft	1.20%	25%	50%	SID
1315 KISS	15.5	53.0	80.5	1.52
1315 KISS+2	14.4	51.0	79.6	1.56
1315 KISS+4	14.2	51.3	79.9	1.57
1315 KISS+6	14.4	51.2	79.4	1.58
Range	1.30	2.00	1.10	0.06

Med Firm	1.20%	25%	50%	SID
1015 KISS	14.2	50.3	81.5	1.56
1015 KISS+2	14.2	53.1	82.5	1.58
1015 KISS+4	14.5	53.6	83.5	1.64
1015 KISS+6	16.1	53.1	83.2	1.64
Range	1.90	3.30	2.00	0.08

Firmest	1.20%	25%	50%	SID
1515 KISS	14.0	53.0	82.4	1.59
1515 KISS+2	14.5	53.0	83.1	1.59
1515 KISS+4	14.7	51.3	82.9	1.63
1515 KISS+6	14.2	52.7	83.5	1.60
Range	0.70	1.70	1.10	0.04

Softest	1.20%	25%	50%	SID
4.2 KISS	14.2	51.9	77.8	1.51
4.2 KISS+2	14.2	53.9	78.9	1.53
4.2 KISS+4	15.0	56.3	81.0	1.51
4.2 KISS+6	14.4	56.1	82.6	1.53
Range	0.80	4.40	4.80	0.02

Firmest	1.20%	25%	50%	SID
4.4 KISS	13.0	52.6	77.4	1.56
4.4 KISS+2	12.9	53.0	79.9	1.56
4.4 KISS+4	13.1	52.6	79.7	1.54
4.4 KISS+6	12.3	52.9	80.8	1.56
Range	0.80	0.40	3.40	0.02

Softest	1.20%	25%	50%	SID
52117 KISS	14.1	50.9	78.1	1.49
52117 KISS+2	13.8	51.6	78.8	1.49
52117 KISS+4	14.5	52.8	80.4	1.51
52117 KISS+6	15.0	55.6	81.7	1.54
Range	1.20	4.70	3.60	0.05

Firmest	1.20%	25%	50%	SID
52115 KISS	14.0	51.6	80.4	1.50
52115 KISS+2	14.1	52.9	81.3	1.57
52115 KISS+4	14.3	52.6	81.7	1.62
52115 KISS+6	14.4	53.0	82.8	1.62
Range	0.40	1.40	2.40	0.12

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Results Summary

Water Inks

Softest	1.20%	25%	50%	SID
1920 KISS	10.9	49.6	71.0	1.44
1920 KISS+2	14.1	54.2	76.7	1.45
1920 KISS+4	13.4	55.3	78.1	1.51
1920 KISS+6	13.9	54.7	76.5	1.50
Range	3.20	5.70	7.10	0.07

Med Soft	1.20%	25%	50%	SID
1320 KISS	7.9	50.0	72.4	1.43
1320 KISS+2	11.0	49.4	73.0	1.56
1320 KISS+4	15.0	49.5	71.4	1.55
1320 KISS+6	16.1	49.5	72.0	1.55
Range	3.20	5.70	7.10	0.07

Med Firm	1.20%	25%	50%	SID
1020 KISS	13.6	47.8	70.1	1.52
1020 KISS+2	15	49.5	70.6	1.60
1020 KISS+4	16.9	47.6	71.2	1.63
1020 KISS+6	13.9	49.7	71.5	1.63
Range	3.30	2.10	1.40	0.11

Firmest	1.20%	25%	50%	SID
1520 KISS	9.6	50.8	72.5	1.61
1520 KISS+2	13.0	48.4	70.3	1.61
1520 KISS+4	14.5	46.6	70.9	1.59
1520 KISS+6	16.0	46.4	71.3	1.60
Range	6.40	4.40	2.20	0.02

Softest	1.20%	25%	50%	SID
5.2 KISS	8.10	48.80	69.60	1.53
5.2 KISS+2	9.20	49.40	71.60	1.55
5.2 KISS+4	16.60	48.00	72.30	1.57
5.2 KISS+6	16.40	51.70	73.90	1.58
Range	8.50	3.70	4.30	0.05

Firmest	1.20%	25%	50%	SID
5.4 KISS	9.1	50.4	74.0	1.55
5.4 KISS+2	5.9	46.7	69.0	1.62
5.4 KISS+4	n/a	50.8	71.7	1.65
5.4 KISS+6	n/a	48.5	73.0	1.70
Range	3.20	4.10	5.00	0.15

Softest	1.20%	25%	50%	SID
52117 KISS	8.40	52.20	77.00	1.41
52117 KISS+2	12.50	55.70	79.10	1.44
52117 KISS+4	14.30	57.70	79.60	1.48
52117 KISS+6	11.50	59.80	80.70	1.50
Range	5.90	7.60	3.70	0.09

Firmest	1.20%	25%	50%	SID
52115 KISS	9.1	51.7	74.5	1.57
52115 KISS+2	14.8	49.4	71.8	1.61
52115 KISS+4	15.5	50.9	71.8	1.63
52115 KISS+6	16.3	48.4	72.3	1.63
Range	7.20	3.30	2.70	0.06

1st Trial – UV Ink

1. Solid Ink Density:
    a. All tapes performed well and offered sufficient density.
    b. Density was also consistent even as impression increased.
    c. Average Density at Kiss Impression amongst all samples was 1.53.
    d. All samples measured a density within 0.06 density or less of the average 1.53 at Kiss Impression.
2. Dot Gain:
    a. Dot gain was somewhat similar between the samples.
    b. Mixed results on whether firmer or softer tapes offered less dot gain.
    c. Some tapes had a slightly higher dot gain, but this could be easily managed with curves.
3. Impression Latitude:
    a. Most tapes offered good impression latitude.
4. Visual Quality of Solid:
    a. The solids all looked very similar across all plate/tape packages.
5. Visual Quality of Dots:
    a. The 1.2% dots all looked very similar across all plate/tape packages.
    b. The 25% dots all looked very similar across all plate/tape packages.
    c. The 50% dots looked similar for most plate/tape packages, but there were some tapes that did have more slur.
    d. As impression increased, the 50% tonal range was consistently more affected then the highlight or quarter-tone.

UV Inks

Results Summary

	Tape Type	SID	Dot Gain (KISS)	Impression Latitude	Visual Solid	Visual Dot
	1915	Very Good	Moderate Gain	Very Good	Good	OK
👍	1315	Very Good	Moderate Gain	Very Good	Good	Good
👎	1015	**Best**	2nd Most Gain	OK	Good	Worst
👎	1515	**Best**	**Most** Gain	Very Good	Good	Worst
	4.2	Very Good	Moderate Gain	Worst	Good	Good
👍	4.4	Very Good	**Least** Gain	Good	Good	Good
	52117	Good	Moderate Gain	Worst	Good	Good
👍	52115	Very Good	Moderate Gain	OK	Good	OK

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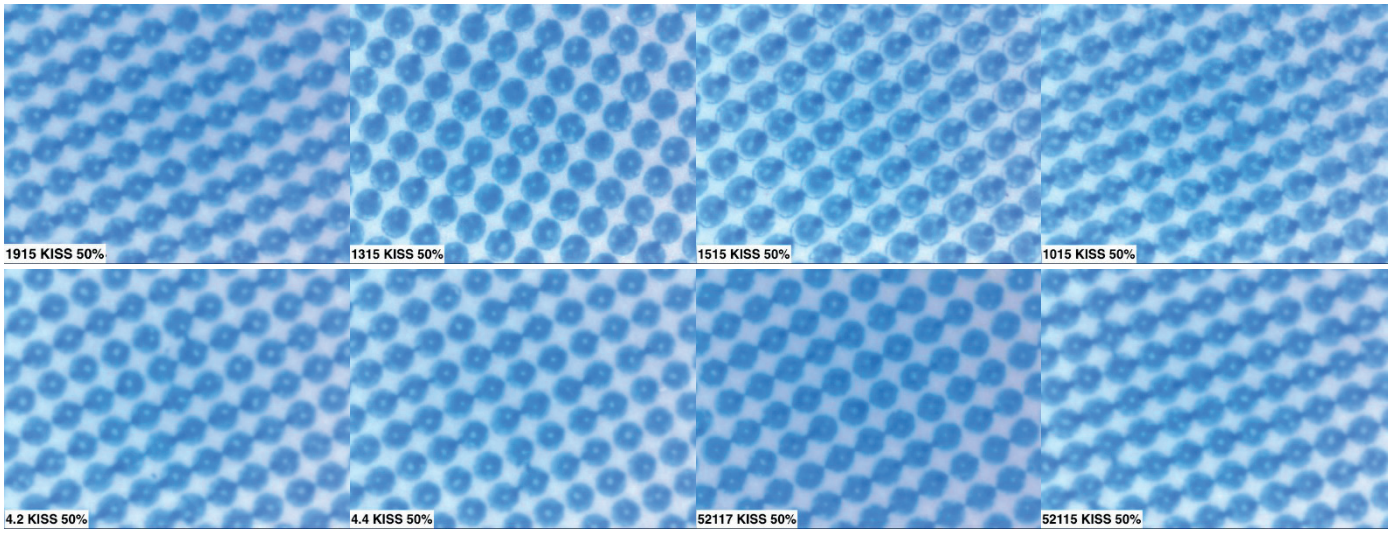

2nd Trial – Water-Based Ink

1. Solid Ink Density:
    a. All tapes performed well and offered sufficient density.
    b. Density was also fairly consistent even as impression increased, but less so then in the UV Ink trial.
    c. Average Density at Kiss Impression amongst all samples was 1.51.
    d. All samples measured a density within 0.10 density or less of the average 1.51 at Kiss Impression.
2. Dot Gain:
    a. Dot gain was somewhat similar between the samples with the exception of one sample that was about 5% higher then the average of the other samples when evaluating the 50%.
    b. Mixed results on whether firmer or softer tapes offered less dot gain.
    c. Some tapes had a slightly higher dot gain, but this could be easily managed with curves.
3. Impression Latitude:
    a. Some of the tapes offered good impression latitude, but all were less consistent then the UV trial. One tape performed with significantly less consistency then the others.
    b. In general, dots tended to slur and get dirty more so with the water-based ink run. The 1.2% dots printed dirty and had a tendency to dry on the plate so plate had to be cleaned several times.
4. Visual Quality of Solid:
    a. The solids all looked very similar across all plate/tape packages.
5. Visual Quality of Dots:
    a. The 1.2% dots did *not* print well across all plate/tape packages.
    b. The 25% dots all looked more similar across all plate/tape packages, with the exception of one tape that showed more slur then expected.
    c. The 50% dots looked similar for most plate/tape packages, with the exception of one tape that showed more slur then expected.
    d. As impression increased, all percentages evaluated gained more so then with the UV trial.

Water Inks

Results Summary

Tape Type	SID	Dot Gain (KISS)	Impression Latitude	Visual Solid	Visual Dot
1920	Good	Moderate Gain	Worst	Good	OK
1320	Good	Moderate Gain	Very Good	Good	OK
1020	Very Good	**Least** Gain	Very Good	Very Good	Good
1520	**Best**	Moderate Gain	Good	Good	OK
5.2	Very Good	**Least** Gain	Worst	Good	Good
5.4	Very Good	Moderate Gain	Worst	Very Good	OK
52117	Good	**Most** Gain	OK	Good	Worst
52115	**Best**	Moderate Gain	Good	Very Good	OK

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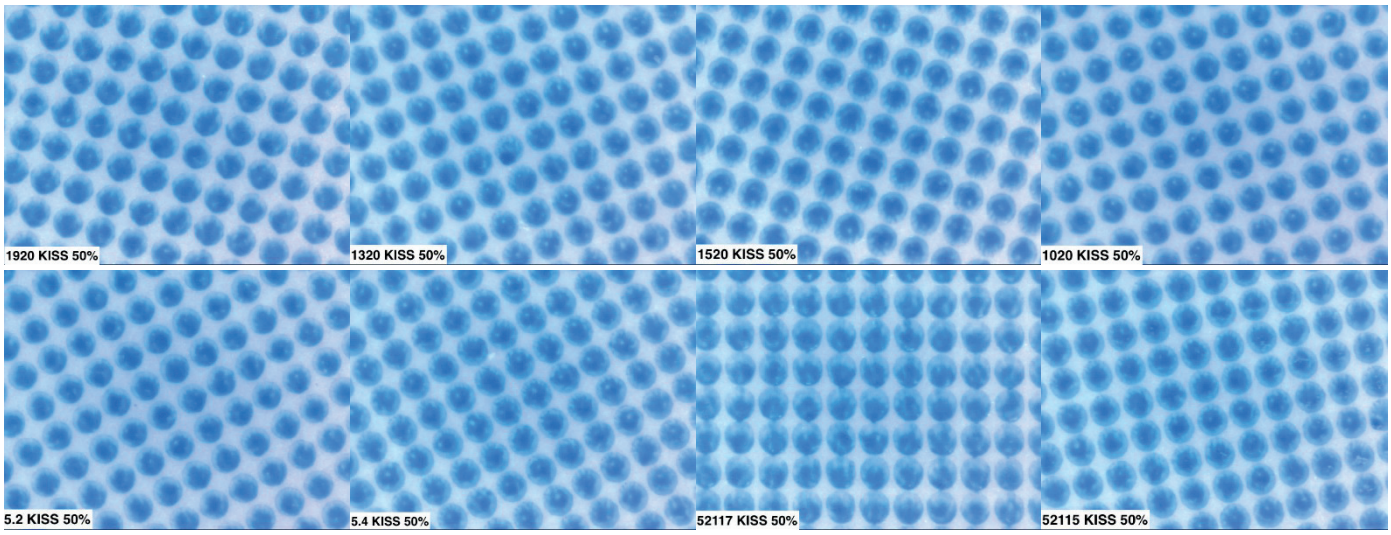

Next Steps...

Our intent at this point is to continue this research and conduct another trial to see if we can determine any further correlation or indicators to support or disprove our hypothesis. In Part Two we will expand our assessment of the plate/tape package measuring ink delivery beyond solid ink density and dot area measurements to better understand the potential successes and failures for flat-top plate print results. We will also attempt to do this testing for a "longer run" job.